UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/724,271	11/26/2003	Rasmus B. Jensen	02716.0011.NPUS00	1257

27194 7590 07/19/2007

HOWREY LLP
C/O IP DOCKETING DEPARTMENT
2941 FAIRVIEW PARK DRIVE, SUITE 200
FALLS CHURCH, VA 22042-2924

EXAMINER	
ANGEBRANNDT, MARTIN J	
ART UNIT	**PAPER NUMBER**
1756	

MAIL DATE	DELIVERY MODE
07/19/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/724,271	JENSEN ET AL.	
	Examiner	Art Unit	
	Martin J. Angebranndt	1756	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *14 May 2007*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-14,26-30 and 32* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-14,26-30 and 32* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

1. The response of the applicant has been read and given careful consideration. Responses to the arguments of the applicant are presented after the first rejection to which they are directed.

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claims 1,2,4,8,9,12-14 and 29 are rejected under 35 U.S.C. 102(a) as being clearly anticipated by Krebs et al., "Detection of fast light activated H+ release and M intermediate formation from proteorhodopsin", BMC Physiology, Vol. 2 pp. 5-12 (8 pages) (04/2002).

Krebs et al., "Detection of fast light activated H+ release and M intermediate formation from proteorhodopsin", BMC Physiology, Vol. 2 pp. 5-12 (8 pages) (04/2002) teaches that at pH 8 proetorhodopsin undergoes a photocycle similar to that of bacteriorhodopsin. (page 5-6, numbered 1 of 8 and 2 of 8). Figures 3-5 show the M state formation and this is further discussed on page 9 in the right column (numbered 5 of 8). The proeteorhodomsin is expressed in a strain

of E coli and cultured. These cells were collected and purified by washing and centrafugation. The cells were then lysed and centrafuged again collecting the supernatant. Repeated washings and collection of the supernatant phase were performed and pooled. The OG solubilized membrane extract was then purified on a Phenylseparose column and selected fractions eluted by the column combined. These fractions were then further purified by passage through hydroylapatite column using an β-octyl-D-glucoside (OG) eluent and selected fraction combined. The resulting fractions would be purified detergent solubilized proetorhodopsin in monomeric and/or oligmeric form . This is then used in subsequent experiments including SDS/polyarylamide gel electrophoresis (the gel is conventionally coated on a glass substrate), where the acrylamide gel (a hydrophilic polymer matrix) is held to immobilize the purified Proteorhodopsin and SDS is a detergent solubilizing the pR. (page 7 or 8). These pR samples are stable for several months (pages 2 of 8, bottom right). The purification result in an 85% purity and requires less time or effort than for bR membrane of similar purity. The spectroscopic analysis is done in micelles. (page 11 (numbered 7 of 8)). The flash photolysis was performed in the presence of micelles or 1,2-dihetanoyl-SN-glycero-3-phosphocholine (considered a surfactant) and most of the detergent is removed as discussed on the eighth page.

The claims do not specify the type of information and is considered and statement of intended use.

With respect to the arguments of the applicant that the Krebs reference has the Proteorhodposin in a solution phase and not fixed/bound to a solid. The examiner points to the use of arylamide gel as a hydrophilic polymer by the applicant in the instant application and notes that the claims do not specify that the Proteorhodopsin is bound to the polymer. The

position of the examiner is that the claims embrace dispersal of the Proteorhodopsin in the polymer, as well as covalently bound to the polymers (see prepub at [0045]). In the acrylamide matrix these would be expected to be stable for at least one month. The primary reference teaches the monomeric/oligomeric form in an polyacryamide gel, so the closest prior art is not bacteriorhodopsin based and the issues of their relative stability are less compelling. The application of references discussing bacteriorhodopsin are applied to evidence what applications and uses one of ordinary skill in the art would consider obvious for rhodopsins, particularly Archaeal rhodopsins. The showing by Friedrich et al. "Proteorhodopsin is a light driven proton pump with variable vectorality" J. Mol. Biol. Vol. 321(5) pp. 821-838 (8/2002) provides a reasonable expectation that pR can be used/analyzed spectroscopically in a polyacrylamide matrix and there is a motivation to use this matrix to avoid aggregation of the pR.

Were the claims to specify that the Proteorhodopsin was covalently bound, this rejection and those dependent upon it would be overcome.

5. Claims 1,2,4,8,9,12-14 and 29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Krebs et al., "Detection of fast light activated H+ release and M intermediate formation from proteorhodopsin", BMC Physiology, Vol. 2 pp. 5-12 (8 pages) (04/2002), in view of Friedrich et al. "Proteorhodopsin is a light driven proton pump with variable vectorality" J. Mol. Biol. Vol. 321(5) pp. 821-838 (8/2002).

Friedrich et al. "Proteorhodopsin is a light driven proton pump with variable vectorality" J. Mol. Biol. Vol. 321(5) pp. 821-838 (8/2002) teaches the measurement of absorption spectra with the Proteorhodopsin embedded in 1 mm thick acrylamide gels. (page 835/left column). Teaching of the functional equivalence of Proteorhodopsin and Bacteriorhodposin (BR) is from

the published data (ref 3) presented (page 822/right column). The M state is shown to be present when the pH is 10 as evidenced by figure 5 and the pH 7 includes both M and O species. (page 824) The M state corresponds the to the 410 nm absorption, the K state the 560 nm absorption and the O state the 580 nm absorption. The initial state absorbs at 530 nm (page 824). The application of a blue light after illumination with yellow light is disclosed. (page 829/right column with respect to figures 8b and c). The Proteorhodopsin is purified and reconstituted into dioleoylphospholipids with detergent adsorbing beads being added (right column, page 834). The Proteorhodopsin is embedded in a 1 mm thick polyacrylamide gel and the effects of pH on the spectral properties evaluated in the absence of aggregation (page 835)

It would have been obvious to one skilled in the art to modify the process of Krebs et al., "Detection of fast light activated H+ release and M intermediate formation from proteorhodopsin", BMC Physiology, Vol. 2 pp. 5-12 (8 pages) (04/2002) by performing the spectral analysis in a polyacrylamide matrix, as taught by Friedrich et al. "Proteorhodopsin is a light driven proton pump with variable vectorality" J. Mol. Biol. Vol. 321(5) pp. 821-838 (8/2002) to reduce the effects of aggregation. In modifying the process, a purified detergent stabilized Proteorhodpsin would be incorporated into a polyacrylamide matrix.

6. Claims 1-10,12-14 and 26-30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Krebs et al., "Detection of fast light activated H+ release and M intermediate formation from proteorhodopsin", BMC Physiology, Vol. 2 pp. 5-12 (8 pages) (04/2002), in view of Friedrich et al. "Proteorhodopsin is a light driven proton pump with variable vectorality" J. Mol. Biol. Vol. 321(5) pp. 821-838 (8/2002), further in view of Hampp et al. '279 and/or Wu et al.

"Bacteriorhodopsin encapsulated in transparent solgel glass: A new biomaterial", Chem. Mater. Vol. 5 pp. 115-120 (1993)

Hampp et al. '279 teaches that the bacteriorhodopin longest lived intermediate state is the M state which absorbs at 410 nm. (2/24-42). Useful matrix materials include polyacrylamide, gelatin, agarose, agar, polyvinylpyrrolidone, polyvinyl alcohol, polyvinyl acetate, polyhydroxymethacrylate and polyacrylate (5/34-43). The use of a first wavelength to write information, a second to readout the information and a third to erase the information is taught (6/10-60) see also examples with writing and readout.

Wu et al. "Bacteriorhodopsin encapsulated in transparent solgel glass: A new biomaterial", Chem. Mater. Vol. 5 pp. 115-120 (1993) teaches the formation of a sol-gel silica matrix which allows the photocycle of bacteriorhodopsin to be used including the M state (see figure 5) and the use of this in optical imaging (abstract and page 120).

To address the embodiments bounded by the claims, but not anticipated or rendered obvious above, the examiner holds that it would have been obvious to one skilled in the art to modify the processes rendered obvious by the combination of Krebs et al., "Detection of fast light activated H+ release and M intermediate formation from proteorhodopsin", BMC Physiology, Vol. 2 pp. 5-12 (8 pages) (04/2002) and Friedrich et al. "Proteorhodopsin is a light driven proton pump with variable vectorality" J. Mol. Biol. Vol. 321(5) pp. 821-838 (8/2002) by using other matrix materials, such as gelatin, agarose, agar, polyvinlypyrrolidone, polyvinyl alcohol, polyvinyl acetate, polyhydroxymethacrylate or polyacrylate, taught by Hampp et al. '279 or sol-gel glasses taught by Wu et al. "Bacteriorhodopsin encapsulated in transparent solgel glass: A new biomaterial", Chem. Mater. Vol. 5 pp. 115-120 (1993) with a reasonable

expectation of forming a useful optical recording medium or medium for spectroscopic studies of proteorhodopsin and/or by using light to write information by changing the proteorhodopsin to its M state in certain areas and erasing that information with exposure to light of another wavelength as taught by Hampp et al. '279 based upon these compounds being Archaeal rhodopsins exhibiting photosensitivity and the same stable states.

7. Claim 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hampp et al. WO 00/59731 (US 6,616,964 is English equivalent and used in translation), in view of Friedrich et al. "Proteorhodopsin is a light driven proton pump with variable vectorality" J. Mol. Biol. Vol. 321(5) pp. 821-838 (8/2002) and Beja et al. "Bacterial Rhodopsin:Evidence for a new type of phototropy in the sea" Science Vol. 289 pp 1902-1906 (09/2000).

Hampp et al. WO 00/59731 teaches the presence of two high level security features when two different bacteriorhodopin variants are used in the security label ([page 8/lines 15-28], col. 4/lines 25-38). The patterns may be able to be immediately observed, but the authentication is open to the use of instrumental methods, including optical instruments ([5/17-6/32],3/5-48). These may be applied to various substrates including bank notes, art, ID cards, cars and the like as a photochromic ink ([27/14-17],13/24-33). The use of photochromic materials with different coloration and/or color change is taught ([2/22-24], 1/52-54) . This is also taught specifically for bR ([20/7-10, 9/66-10/2)

Beja et al. "Bacterial Rhodopsin:Evidence for a new type of phototropy in the sea" Science Vol. 289 pp 1902-1906 (09/2000) teaches that proteorhodopsins are related to bacteriorhodopsin being found in a proteobacterium and are both Archaeal rhodopsins. (page 1902).

It would have been obvious to modify Hampp et al. WO 00/59731 by using other closely related rhodopsins, such as Proteorhodopsin taught by Friedrich et al. "Proteorhodopsin is a light driven proton pump with variable vectorality" J. Mol. Biol. Vol. 321(5) pp. 821-838 (8/2002) and/or Beja et al. "Bacterial Rhodopsin:Evidence for a new type of phototropy in the sea" Science Vol. 289 pp 1902-1906 (09/2000) with a reasonable expectation of achieving comparable results in terms of high and low level security features based upon the disclosure of bacteriorhodopsin and proteorhodopsin being closely related.

The recitation of Hampp et al. WO 00/59731 as part of the rejection addresses the issue of two variants being present and seems to teach different properties for these. The examiner notes that the data in table 1 and that the variation in the wavelength maxima for pR form a single source is small. The examiner holds that the claims embrace even small differences in the absorption maxima. It is clear that using two bR with color differences between them is taught by Hampp et al. WO 00/59731 in the cited text above.

8. Claims 1,2,4,8,9,11,12-14,29 and 32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Krebs et al., "Detection of fast light activated H+ release and M intermediate formation from proteorhodopsin", BMC Physiology, Vol. 2 pp. 5-12 (8 pages) (04/2002), in view of Friedrich et al. "Proteorhodopsin is a light driven proton pump with variable vectorality" J. Mol. Biol. Vol. 321(5) pp. 821-838 (8/2002), further in view of Hampp et al. WO 00/59731 (US 6,616,964 is English equivalent and used in translation) and Beja et al. "Bacterial Rhodopsin:Evidence for a new type of phototropy in the sea" Science Vol. 289 pp 1902-1906 (09/2000).

To address embodiments bounded by the claims, but not anticipated or rendered obvious above the examiner holds that it would have been obvious to modify the processes rendered obvious by Krebs et al., "Detection of fast light activated H+ release and M intermediate formation from proteorhodopsin", BMC Physiology, Vol. 2 pp. 5-12 (8 pages) (04/2002), in view of Friedrich et al. "Proteorhodopsin is a light driven proton pump with variable vectorality" J. Mol. Biol. Vol. 321(5) pp. 821-838 (8/2002) by incorporating at least two variants as taught by Hampp et al. WO 00/59731 which could be separated as discussed by Beja et al. "Bacterial Rhodopsin:Evidence for a new type of phototropy in the sea" Science Vol. 289 pp 1902-1906 (09/2000) and would be separately distinguishable on the basis of optical properties.

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Martin J. Angebranndt whose telephone number is 571-272-1378. The examiner can normally be reached on Monday-Thursday and alternate Fridays.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mark Huff can be reached on 571-272-1385. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Martin J Angebranndt
Primary Examiner
Art Unit 1756

2/13/07
~~02/14/2007~~